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THE REFORESTATION JOB IN THE LAKE STATES - A NEW ESTIMATE

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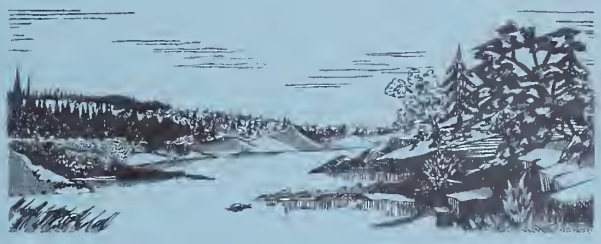

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LAKE STATES FOREST EXPERIMENT STATION

UNIVERSITY FARM, ST. PAUL 1, MINN.

E. L. DEMMON, DIRECTOR

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THE REFORESTATION JOB IN THE LAKE STATES - A NEW ESTIMATE 2/

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To plan a sound reforestation program, it is necessary to have the best possible knowledge of the area in need of planting. Past estimates have set the area in need of reforestation in the Lake States at 20 million,3/ 15 million,4/ 8.8 million,5/ and 3 million acres.6/ None of them were applicable to areas less than a state in size. To get figures more up-to-date and applicable to more local areas, a new estimate7/ was made recently. It shows about 12 1/2 million acres of forest land in the Lake States now in need of reforestation. To describe how this estimate was derived and what sort of program it calls for are the purposes of this paper.

1/ Maintained at University Farm, St. Paul, Minnesota, in cooperation with the University of Minnesota.
2/ Paper delivered at Ann Arbor, Michigan, April 12, 1946, before the Michigan Academy of Science, Arts, and Letters.
3/ Kittredge, Joseph Jr. Forest planting in the Lake States. U.S.D.A. Dept. Bull. 1497, 87 pp., illus., 1929.
4/ Wales, H. Basil. Forest planting in the Lake States. Jour. Forestry 37:691-694. 1939.
5/ Land Committee. Public works and rural land use. Rept. of Land Comm. to Natl. Res. Plan. Board; pp. 115-118, Sept., 1942.
6/ Cunningham, R. N., and Moser, H. C. Forest areas and timber volumes in the Lake States. Economic Note No. 10, Lake States Forest Experiment Station, 84 pp. (processed) March, 1938.
7/ This estimate was derived from a revision of Forest Survey data brought down to January 1, 1945.

Areas in Need of Reforestation

Three kinds of areas were considered for reforestation now: (1) deforested areas, (2) "off-site" aspen stands, and (3) understocked seedling, sapling, and pole areas. Only upland areas were included. Forest lands too low in productivity for commercial wood production and those devoted to park purposes, some kinds of wildlife management, or other uses in which timber cutting is prohibited or restricted have been excluded from the estimate. It has been assumed that present commercial forest land will continue to be used primarily for wood production. Plantable areas have been estimated for 13 economic units each containing an average of about 4 million acres of commercial forest land.

Deforested Areas

Deforested land, which includes all areas less than 10 percent stocked and seedling and sapling areas 10 to 40 percent stocked, often is considered as synonymous with area in need of reforestation. This is not entirely correct, as in the Lake States the 14 million acres of deforested land include some 2 1/2 million acres of lowland and swamp types. These cannot be planted economically by methods known at present. In addition, some of the remaining area will be regenerated naturally. To compensate for this trend, deforested pine areas were reduced by 10 percent, northern hardwood lands by 90 percent, oak and aspen-birch lands by 40 percent, and spruce-fir areas by 50 percent. This left a little over 5 1/2 million acres of deforested land classed as plantable (table 1).

"Off-site" Aspen Areas

In addition to the deforested land there are about 6 million acres of aspen land (exclusive of deforested areas) which are growing on former pine sites. This "off-site" aspen usually becomes defective before reaching merchantable size in commercial quantities. The land is capable of bearing valuable pine stands, but these can be established only by conversion

Table 1.--Estimated plantable deforested land in Lake States (commercial forest land only).

State and economic unit		Original type								Species to be planted							Ownership				
		White pine	Red pine	Jack pine	Northern hardwoods	Oak	Spruce-fir	Aspen-birch	Total	White pine	Red pine	Jack pine	White spruce	Northern hardwoods	Red oak	Total	Federal	State	County & Mun.	Farmers	Other private
		M acres								M acres							M acres				
Minnesota																					
Northeastern	1	16	1	121	5	2	87	334	566	96	132	183	155	...	...	566	65	86	198	92	125
Central pine	2	14	20	162	8	7	29	364	604	92	141	245	126	...	...	604	76	108	224	170	26
Rainy River	3	4	4	8	(1/)	...	20	107	143	26	41	32	44	...	...	143	3	83	21	10	26
Hardwood	5	3	2	3	21	116	(1/)	176	321	41	94	93	53	20	20	321	0	0	4	317	0
Prairie	6	1	1	1	7	95	1	100	206	26	66	61	28	11	14	206	0	7	7	145	47
Total state		38	28	295	41	220	137	1,081	1,840	281	474	614	406	31	34	1,840	144	284	454	734	224
Wisconsin																					
Northeastern	1	16	10	28	14	11	55	276	410	58	103	97	108	29	15	410	58	19	131	88	114
Northwestern	2	10	2	95	24	17	55	400	603	77	139	180	143	42	22	603	84	9	256	127	127
Central	3	24	2	131	26	244	9	389	825	92	230	304	113	42	44	825	1	5	85	567	167
Southwestern	4	1	1	11	9	262	...	38	322	33	118	125	13	5	28	322	6	11	47	243	15
Total state		51	15	265	73	534	119	1,103	2,160	260	590	706	377	118	109	2,160	149	44	519	1,025	423
Michigan																					
Eastern U.P.	1	8	4	92	14	...	55	98	271	34	54	109	63	11	...	271	81	94	1	49	46
Western U.P.	2	15	2	11	21	...	50	106	205	31	52	39	65	13	5	205	6	44	1	40	114
Northern L.P.	3	3	5	274	16	56	19	475	848	83	179	371	137	49	29	848	10	124	3	366	345
Southern L.P.	4	3	...	9	14	160	(1/)	118	304	57	121	12	57	22	35	304	2	9	1	256	36
Total state		29	11	386	65	216	124	797	1,628	205	406	531	322	95	69	1,628	99	271	6	711	541
Total Lake States		118	54	946	179	970	380	2,981	5,628	746	1,470	1,851	1,105	244	212	5,628	392	599	979	2,470	1,188

1/ Less than 0.5.

planting. About half of the "off-site" aspen is in sapling or pole-sized stands, which are too expensive to convert by present methods. This leaves about 3 million acres for conversion planting at present (table 2).

Understocked Seedling, Sapling, and Pole Stands

Beyond the areas requiring complete planting, there are numerous understocked seedling, sapling, and pole stands which need partial planting, or "sweetening" to improve their stocking - and often their composition. These include seedling and sapling stands from 40 to 60 percent stocked and pole stands from 10 to 40 percent stocked. Assuming that northern hardwood and aspen-brich stands of this type will largely improve their stocking by natural means and that lowland and swamp types are not plantable under present knowledge, a total of about 3 3/4 million acres remain for partial planting with perhaps 300-500 trees per acre (table 3).

Species to Plant

Past estimates of the area in need of planting have not gone so far as to show what species were needed, except for one estimate covering northern Wisconsin.[8/] Such information is necessary for the nursery program basic to the planting job. On the basis of general experience, it was estimated that the deforested areas should be planted to the following species according to original cover types:

Cover type	Species to be planted					
	White pine	Red pine	Jack pine	White spruce	Northern hardwoods	Red oak
	Percent					
White pine	20	60	20	...	...	...
Red pine	...	40	60	...	...	...
Jack pine	...	10	90	...	...	...
Northern hardwoods	10	20	20	40	10	...
Oak	10	40	40	...	...	10
Spruce-fir	20	20	...	60	...	...
Aspen-birch	15	25	20	25	10	5

8/ Harrington, C. L., Brener, W. H., and Wilde, S. A. How large is the job of reforestation in Wisconsin Wisc. Cons. Bull. 9(6):6-11, June, 1944.

Table 2.--Estimated planting job in converting "off-site" aspen.

State and economic unit		Species to be planted						Ownership				
		White pine	Red pine	Jack pine	White spruce	Red oak	Total	Federal	State	County & mun.	Farmers	Other private
		M acres										
Minnesota												
Northeastern	1	50	138	122	4	...	319	92	41	100	26	60
Central pine	2	100	253	207	5	...	560	86	125	160	100	89
Rainy River	3	20	44	34	3	...	101	6	61	11	7	16
Hardwood	5	3	6	4	1	1	15	0	0	(1/)	15	(1/)
Prairie	6	0	0	0	0	0	0	0	0	0	0	0
Total state		173	441	367	13	1	995	184	227	271	148	165
Wisconsin												
Northeastern	1	80	143	114	6	28	371	65	20	77	67	142
Northwestern	2	77	135	108	4	27	351	54	8	108	70	111
Central	3	46	81	64	2	16	209	(1/)	1	16	140	52
Southwestern	4	0	(1/)	1	0	0	1	(1/)	(1/)	(1/)	1	(1/)
Total state		203	359	287	12	71	932	119	29	201	278	305
Michigan												
Eastern U.P.	1	30	69	46	5	...	150	29	46	1	11	63
Western U.P.	2	42	90	63	5	6	206	31	41	1	12	121
Northern L.P.	3	174	293	255	2	39	763	74	208	2	144	335
Southern L.P.	4	12	25	11	0	4	52	(1/)	3	(1/)	36	13
Total state		258	477	375	12	49	1,171	134	298	4	203	532
Total Lake States		634	1,277	1,029	37	121	3,098	437	554	476	629	1,002

1/ Less than 0.5.

Table 3.--Understocked seedling and sapling and pole areas in need of partial planting.

State and economic unit		Cover type						Species to plant						Ownership				
		White pine	Red pine	Jack pine	Oak	Spruce-fir	Total	White pine	Red pine	Jack pine	White spruce	Northern hardwoods	Red oak	Federal	State	County & Mun.	Farmers	Other private
		M acres						M acres						M acres				
Minnesota																		
Northeastern	1	21	17	174	4	263	479	86	175	55	163	0	0	159	56	149	35	80
Central pine	2	21	31	212	21	115	400	48	201	72	79	0	0	70	95	104	54	77
Rainy River	3	8	12	43	0	131	194	42	56	16	80	0	0	14	121	18	15	26
Hardwood	5	4	3	3	117	1	128	24	42	14	25	0	23	1	0	7	117	3
Prairie	6	1	1	(1/)	73	5	80	16	23	7	18	1	15	1	11	14	37	17
Total state		55	64	432	215	515	1,281	216	497	164	365	1	38	245	283	292	258	203
Wisconsin																		
Northeastern	1	25	28	44	53	155	305	49	98	24	93	31	10	60	19	62	50	114
Northwestern	2	22	24	123	37	149	355	43	142	46	87	30	7	67	10	106	62	110
Central	3	17	8	94	206	13	338	48	144	51	51	3	41	1	3	25	202	107
Southwestern	4	6	4	12	306	0	328	62	107	36	62	0	61	8	11	32	262	15
Total state		70	64	273	602	317	1,326	202	491	157	293	64	119	136	43	225	576	346
Michigan																		
Eastern U.P.	1	18	29	94	0	152	293	37	112	34	80	30	0	67	98	1	13	114
Western U.P.	2	22	13	27	0	148	210	35	57	11	77	30	0	58	55	1	10	86
Northern L.P.	3	19	49	230	98	71	467	43	242	89	59	14	20	72	144	2	50	199
Southern L.P.	4	10	0	0	116	1	127	25	41	12	26	0	23	2	7	(1/)	64	54
Total state		69	91	351	214	372	1,097	140	452	146	242	74	43	199	304	4	137	453
Total Lake States		194	219	1,056	1,031	1,204	3,704	558	1,440	467	900	139	200	580	630	521	971	1,002

1/ Less than 0.5.

These percentages were applied to the values in table 1 with certain minor exceptions: in the three northern Minnesota units no areas were recommended for planting to northern hardwoods or red oak - the areas so assigned by the percentage values were distributed among the other species; in the same manner no areas were recommended for planting to red oak in eastern Upper Michigan. The results of these calculations show the estimated area to be planted to the major species (table 1). This amounts to 33 percent jack pine, 26 percent red pine, 20 percent white spruce, 13 percent white pine, 4 percent northern hardwoods, and 4 percent red oak.

The amount of the major species to plant on the "off-site" aspen areas was obtained in the same way, except that no northern hardwoods, only a small amount of spruce, and a reduced amount of red oak were recommended (table 2). The proportions to be planted by species are 41 percent red pine, 33 percent jack pine, 21 percent white pine, 4 percent red oak, and 1 percent white spruce.

The basis for selecting the species to be planted on the understocked areas was a little different from that for the areas needing complete planting. It was as follows:

Cover type	Species to be planted					
	White pine	Red pine	Jack pine	White spruce	Northern hardwoods	Red oak
	Percent					
White pine	20	60	...	20	...	...
Red pine	10	70	20	...	...	...
Jack pine	...	70	30	...	...	...
Oak	20	30	10	20	...	20
Spruce-fir	20	10	...	50	20	...

As with the deforested and "off-site" aspen lands, no area in the three northern Minnesota units was recommended for planting to northern hardwoods or red oak. The acreage recommended for planting to the 6 major

species is divided 39 percent for red pine, 24 percent for white spruce, 15 percent for white pine, 13 percent for jack pine, 5 percent for red oak, and 4 percent for northern hardwoods (table 3).

While local conditions may dictate the use of species other than those listed here or alter the basis for selecting them, these estimates do provide a starting point for large-scale planning.

Ownership of Plantable Areas

Some measure of the responsibility for a reforestation program is shown by land ownership. Estimates show that federal agencies own 7 percent of the deforested land, 14 percent of the plantable "off-site" aspen land, and 16 percent of the understocked areas; state agencies own 11 percent of the deforested, 18 percent of the "off-site" aspen, and 17 percent of the understocked land; county and municipal agencies own 17 percent of the deforested, 16 percent of the "off-site" aspen, and 14 percent of the understocked land; farmers own 44 percent of the deforested, 20 percent of the "off-site" aspen, and 26 percent of the understocked areas; and other private owners have 32 percent of the deforested, 21 percent of the "off-site" aspen, and 27 percent of the understocked land (tables 1, 2, and 3).

It is clear that the responsibility for reforestation in the Lake States is not entirely a public matter. Private owners have a bigger job confronting them than do public agencies. Of course, tax delinquency will probably convert some of these lands from private to public ownership, and more public aid may have to be provided private owners to stimulate reforestation. The public probably will have to play a role larger than indicated by its ownership.

A Big Program Needed

To reforest the entire 12 1/2 million acres in the Lake States would be a tremendous program. It could provide about 1 1/4 million man-months of work. Later, release and other care could provide an additional 3/4

million or more man-months of work. At prewar prices such a planting program would cost over 180 million dollars and the after-care needed would cost about 30 million dollars more; present costs would be considerably higher. If such a program were carried out over a 50-year period, it would require the annual planting of 250,000 acres, over 100,000 acres greater than the peak program during the CCC and WPA days. It would also mean the annual production of some 200 million plantable trees in nurseries.

Whether or not the complete program will ever be undertaken is uncertain. Some factors, other than economic or political ones, which might tend to reduce it are: (1) More rapid natural regeneration than past experience indicates, (2) greater shifts of plantable forest land to parks, recreational areas, wildlife areas, or uses other than wood production, and (3) new uses for small and defective aspen on "off-site" lands. There are also some factors which might increase the program, such as (1) increased forest fires and destructive cutting, (2) workable methods of reforesting lowland and swamp lands, and (3) later conversion planting on the 3 million acres of sapling and pole-sized off-site aspen.

If even half of the program mentioned here is undertaken, it will still be a huge one. These estimates can serve a useful point from which to start planning either the full or a reduced program.